

BRISTOL BAY RED KING CRAB FISHERY, 1997  
REPORT TO THE ALASKA BOARD OF FISHERIES

by

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## **KING CRAB REGISTRATION AREA T BRISTOL BAY**

### ***Description of Area***

The Bristol Bay king crab Management Area T includes all waters north of Cape Sarichef, east of 168° W. long. and south of the latitude of Cape Newenham and includes all waters of Bristol Bay (Figure 1).

### ***Historic Background***

Commercial fishing for red king crabs (*Paralithodes camtschatica*) in the Bering Sea began with Japanese harvests in 1930. Their presence continued in this fishery until 1940 and then again from 1953 until 1974. The Russian king crab fleet operated in the eastern Bering Sea from 1959 through 1971. U.S. fishers entered the eastern Bering Sea fishery with trawl gear in 1947. Effort and catches declined in the 1950's with no catch being reported in 1959. A period of fluctuating low catches followed through 1966 before expanding into a full-scale fishery in the late 1970's.

The red king crab fishery in the eastern Bering Sea traditionally harvested crabs from waters north of Unimak Island and the Alaska Peninsula from Cape Sarichef to Port Heiden. With the decline of king crab stocks in other areas of the state in 1968, U. S. effort increased in the eastern Bering Sea with a record catch of 129.9 million pounds in 1980 (Figure 2 and Table 1). As in other areas of the state, the stocks crashed in the early 1980's and have remained depressed.

In 1980, the Alaska Board of Fisheries (BOF) defined that portion of the Bering Sea south of Cape Newenham and east of 168° W. long. as the Bristol Bay King Crab Registration T (Figure 1). This area was designated an exclusive registration area. During any king crab registration year (June 28 through June 27), vessels registering for and fishing in this area are prohibited from fishing in any other exclusive or super exclusive registration areas. Only non-exclusive areas (the Bering Sea Area Q and or Aleutians Area O) could subsequently be fished.

The National Marine Fisheries Service (NMFS) has conducted annual trawl abundance index surveys of the eastern Bering Sea since 1968. This multi-species (crab and groundfish) survey is conducted during the summer months and resulting area-swept estimates of abundance are published annually. In 1983, the NMFS trawl survey of the Bering Sea indicated a record low number of legal male crabs and the lowest total king crab population ever recorded. Small female crabs carrying fewer eggs and high predator abundance was also noted. As a result, the fishery was closed for the 1983 season. The fishery reopened in 1984 and catches slowly increased to over 20.3 million pounds in 1990 (Table 1). Due to the large number of catcher-processors and floating processors in the fishery and the inability of the Alaska Department of Fish and Game (ADF&G) to monitor these catches, an observer program was initiated in 1988. Fishing effort increased dramatically from 89 vessels in 1984 to over 300 vessels in 1991. The number of pots being fished by the fleet also increased, with almost 90,000 pots registered for the 1991 fishery, compared to 21,762 in 1984.

As a result of the increased number of pots, the BOF established a 250 pot limit, which was implemented for the 1992 Bristol Bay red king crab fishery. This measure was intended to improve

manageability of the fishery by extending the length of the season and reduce the potential for pot loss. Pot limits were applied through a buoy sticker program.

Immediately following the 1992 Bristol Bay red king crab fishery, the 250 pot limit was repealed by the NMFS. This action was due to perceived inconsistencies with provisions of the Bering Sea/Aleutian Islands king and Tanner crab Federal Management Plan (FMP), which mandated application of pot limits in a nondiscriminatory manner. In the spring of 1993, the BOF passed new regulations, which set pot limits based on overall vessel length. For the Bristol Bay king crab fishery, vessels in excess of 125 feet in overall length were limited to 250 pots and vessels 125 feet and under in length overall were allowed a total of 200 pots. These pot limits were applied through a buoy tag program from the Dutch Harbor and Kodiak ADF&G offices.

Harvest shortfalls in both the St. Matthew blue king and Pribilof Islands red king crab fisheries in mid-September 1993 prompted a meeting in Seattle between fishermen, industry representatives and staff from ADF&G and NMFS to discuss methods to improve in-season data collection and management. As a result, ADF&G purchased the necessary computer hardware and software and set up a confidential satellite reporting system, which could be used for daily in-season catch reporting.

Daily vessel reports received via single side band radio and marine telex were used to manage the 1993 Bristol Bay red king crab fishery. That season ran for 9 days and the total harvest was 14.6 million pounds, approximately 2.2 million pounds short of the 16.8 million pound harvest guideline midpoint.

Results of the NMFS 1994 summer trawl survey of the Eastern Bering Sea indicated declines in all size classes of both male and female red king crabs in the Bristol Bay area. Compared to observations made during the 1993 survey, the abundance index of large male crabs declined 25%. Based on 1994 survey results, large female abundance was estimated at 7.5 million crabs, which was below the minimum threshold of 8.4 million crabs necessary to allow a fishery. As a result, the Bristol Bay area was not open to fishing for the 1994 season.

Due to measurement errors in the area-swept trawl abundance estimates, the ADF&G developed a length-based analysis (LBA) for estimating population abundance. This method, used for the first time prior to the 1995 season, incorporates a variety of data sources (dock side sampling, observer collected data, etc.) as well as data collected on the annual survey. This method is less susceptible to year-to-year variations in factors unrelated to population abundance (oceanographic conditions, changes in species distribution and subsequent availability to the survey gear, etc.) and is therefore more likely to produce a more accurate estimation of abundance. Analysis of the 1995 NMFS survey using the LBA indicated no significant difference in the abundance of mature male and female red king crabs from estimates made from the 1994 survey (Zheng et al. 1995). Consequently, the Bristol Bay red king crab fishery remained closed for the 1995 season.

Due to the depressed nature of the Bristol Bay red king crab population, the BOF, at their March 1996 meeting, adopted a revised harvest strategy to promote stock rebuilding. One of the most significant changes to the harvest strategy was a reduction in the exploitation rate of mature male crabs from 20% down to 10% at levels below where the stock is considered rebuilt (55 million pounds of effective spawning biomass).

Results of the LBA analysis of the 1996 NMFS survey data indicated increased abundance of all size classes of males and females compared to the 1995 estimate. Most significant, relative to the prior two years fishery closures due to insufficient numbers of large female crabs, was an increase in the number of large females in 1996 to 10.2 million crabs, well above the 8.4 million large female threshold necessary for a fishery (Zheng et al. 1996). Based on a 10% exploitation rate the 1996 GHF was set at 5.0 million pounds. The 1996 fishery lasted four days and a total of 8.4 million pounds were harvested. This was 68% over the 5.0 million pound GHF.

As a result of the ADF&G's inability to adequately manage this fishery at low GHF levels, the BOF held a special meeting in August of 1997 implementing stricter pot limits and vessel pre-registration requirements. Also adopted were regulations which extended the tank inspection window for the Bristol Bay fishery from 24 to 30 hours and allowed fishermen to leave baited pots on the fishing grounds after a closure announcement of less than 24 hours. New pot limits were based, not only on vessel overall length, but also the pre-season GHF and the number of vessel which pre-registered for the fishery. These new pot limit regulations were adopted with a sunset provision of December 31, 1998, to provide for reevaluation at the 1999 BOF meetings. Specific information on pot limits based on GHF and number of vessels participating in the Bristol Bay fishery are found under 5 AAC 34.825 of the 1997-98 Commercial Shellfish Fishing Regulations.

### *1997 Fishery*

The Bristol Bay Management Area T opened to fishing for red and blue king crabs at 4:00 p.m. on November 1, 1997. A total of 256 vessels, including 8 catcher processors made 265 landings for a total harvest of 8.8 million pounds of red king crabs (Table 1). The 1997 fishery lasted four days and was closed by emergency order at 18:00 hours on November 5. Three floating processors also registered and purchased crabs on the grounds during the fishery.

Based on the 7 million pound pre-season GHF and the 259 vessels which registered by the October 3 pre-registration deadline, vessels greater than 125' were permitted to fish a maximum 125 pots while vessels 125' and smaller were permitted a maximum of 100 pots.

A total of 259 vessels purchased 27,870 buoy tags for the 1997 Bristol Bay king crab fishery. This compares to 200 vessels which purchased 40,586 tags for the 1996 season. Three vessels purchased buoy tags for the 1997 red king crab fishery but did not participate and not all vessels participating fished their full complement of gear. The total number of pots registered for the 1997 season was 27,499 (Table 2). All vessels which qualified for the Pribilof hair crab fishery, which in 1997 also opened on November 1, chose to first participate in the Bristol Bay fishery before heading to the directed hair crab fishery.

Tank inspections were conducted beginning at 10:00 a.m. on October 31, 30 hours prior to the fishery opening. ADF&G personnel conducted a total of 70 tank inspections in King Cove, 44 in Akutan, two in St. Paul and 141 in Dutch Harbor. The majority of the fleet was registered using the quick registration process where vessel holds and gear are inspected within the several days leading up to regular tank inspections. Operators of vessels, which have been pre-inspected, can then proceed to signing locations and have their vessel registrations validated within minutes of the beginning of the tank inspection window. This quick registration process was first implemented for

the 1997 Bering Sea snow crab fishery. In addition to vessel hold inspections, ADF&G staff examined fishing gear aboard all vessels for pot mesh, tag and tunnel size requirements.

The 1997 Bristol Bay king crab fishery was managed by means of daily inseason reports from fishermen. A total of 182 vessel operators or 71% of participants, from both the small ( $\leq 125$  feet) and large ( $>125$  feet) vessels groups signed up to report numbers of pots fished and number of crabs retained daily. The total number of vessels which actually reported during the fishery ranged from 116 (45% of the fleet) on November 3 to 63 (25% of the fleet) on November 5. These numbers do not include the 8 catcher processors, which were required to report daily via single side band radio. The number of vessels reporting declined after the fishery closure was announced on November 4. Reports were received via marine telex and over single side band radio. Vessels participating in marine telex reporting submitted catch information on a 12-hour basis, while single side band reporters submitted information every 24 hours.

Vessel catch reports indicated the number of legal crabs per pot pull (CPUE) was 8.5 during the first 26 hours of fishing. CPUE rose to 11.3 and 13.0 on November 3 and 4, respectively. By 6:00 p.m. on November 4, the projected harvest was 3,660,552 pounds and fishery performance suggested that the GHL of 7.0 million would be met by 6:00 p.m. on November 5. A fishery closure for 6:00 p.m. on November 5 was announced at 9:45 p.m. on November 4, 20 hours in advance of the closure. The fishery closure announcement was faxed to all processors and fisheries related organizations on the ADF&G's Westward Region fax distribution list and put out over single side band radio on frequency 4125.

Catch projections based on inseason reports through the closure of the fishery indicated a total harvest of 9.6 million pounds and a fishery CPUE of 15.1 crabs per pot pull. These figures would prove to be somewhat inflated as the postseason fishticket information yielded an 8.8 million pound total harvest and a CPUE of 15 for the fishery. However, in the 20 hours following the closure announcement, the fleet landed approximately 3 million pounds of red king crabs with a CPUE of over 18 crabs per pot. The ADF&G did not expect landings of such magnitude over such a short period, as CPUE of over 18 crabs per pot had not been observed since before 1980. The 1997 fishery CPUE of 15 was lower than the CPUE of 16 observed in the 1996 fishery but higher than the CPUE of 6 to 12 observed in the four seasons from 1990 to 1993. CPUE ranged from 8.5 crabs per pot on November 2 to 18.5 crabs per pot on November 5.

A total of 90,510 pots were pulled during the 1997 Bristol Bay red king crab fishery. This is an increase over the 76,433 pots lifted in the 1996 but far fewer than the 253,794 pots pulled during the 1993 fishery. Comparing the 90,510 pot pulls reported during the 1997 fishery to the 27,499 pots registered, it appears fishermen pulled their pots an average of 3.3 times over the course of the fishery. This compares to an average of 1.9 and 4.3 pulls for each pot registered for the 1996 and 1993 seasons, respectively. In 1997, fishermen reported acceptable levels of catch from pots that had soaked as little as 8 hours, with very acceptable levels of catch being reported from gear that had soaked 12 hours. This is in contrast to anecdotal reports from fishermen in 1996 and 1993 indicating minimum soak times of 15 and 24 hours, respectively were required to effect acceptable catches.

Bristol Bay red king crabs harvested in 1997 averaged 6.7 pounds. This is equal to the overall average weight observed in 1996 and greater than the 6.5 pound average recorded for the 1993 fishery. The 1997 average weight is among the highest recorded in the 1990's and is well above the averages seen in the 1970's and 80's (Table 1).

Exvessel price of Bristol Bay red king crabs for the 1997 season was \$3.26 per pound; the second lowest price paid since 1986. Total fishery value for 1997 was \$28.5 million. This compares to an exvessel value of \$4.00 per pound and a fishery value of \$33.6 million for the 1996 season (Table 2 and Figure 3).

Post-recruit crabs, those crabs that have been of legal size for more than one season, made up 72% of the 1997 harvest. The remaining 28% of the harvest was made up of recruit size crabs, with the majority being new-shelled (Table 3). The mean carapace length of crabs harvested in 1997 was 152 millimeters. As was the case in 1996, the large percentage of post recruit crabs in the catch is thought to be responsible for the higher average weight observed in 1997.

The majority of the 1997 harvest came from five statistical areas located in the center of the Bristol Bay Management Area between 162° and 164° W. long. and 56° and 57° N. lat. This is the traditional area of harvest and the same general area where the majority of the harvest occurred in 1996 and 1993 (Table 4).

Under the provisions of 5 AAC 34.827 (c), vessels were permitted to leave baited gear on the grounds for up to 10 days following the closure announcement because less than 24 hours notice was given when the announcement was issued. The majority of vessels chose, however, to bring their full complement of gear to their point of delivery. One vessel experienced a major mechanical breakdown and was unable to make a landing. One vessel was cited for fishing within the Bristol Bay registration area within the 14 days prior to the fishery in that area according to 5 AAC 34.053 (1).

### *Status of Stocks*

Based on analysis of the 1997 NMFS survey results, all components of the Bristol Bay red king crab stock increased from levels observed in 1996 (Stevens et al. 1998). This was expected for all segments of the stock except for legal males, which increased from an estimated 5.58 million in 1996 to 9.4 million animals in 1997. Large females (>89 mm carapace length) increased from 11.9 million in 1996 to 25.3 million crabs in 1997.

Estimates based on the LBA were more conservative than the survey analysis, but also showed increases in abundance for all segments of the stock from 1996 to 1997. LBA estimates of legal males increased from 5.26 million animals in 1996 to 5.90 in 1997. Large female abundance, according the LBA increased from 10.18 in 1996 to 23.7 million crabs in 1997 (Zheng et al. 1997).

This stock remains depressed and will be managed based on a 10% exploitation rate of the mature male population. However, positive signs of recruitment, evident in both the survey and LBA analysis, indicate an increase in abundance and possibly in the harvestable surplus of legal males for the 1998 season.



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Table 1. Bristol Bay, Area T of the Bering Sea, commercial red king crab catch statistics, 1966-1997

Year	Number of		Harvest <sup>a</sup> (pounds)	Pots Pulled	Average		CPUE <sup>b</sup>	% Old Shell	Deadloss (pounds)
	Vessels	Landings Crab <sup>a</sup>			Weight (pounds)	Length (mm)			
1966	9	15	140,554	997,321	2,720	7.1	52		
1967	20	61	397,307	3,102,443	10,621	7.8	37		
1968	59	261	1,278,592	8,686,546	47,496	6.8	27		
1969	65	377	1,749,022	10,403,283	98,426	5.9	18		
1970	51	309	1,682,591	8,559,178	96,658	5.1	17		
1971	52	394	2,404,681	12,955,776	118,522	5.4	20		
1972	64	611	3,994,356	21,744,924	205,045	5.4	19		
1973	67	441	4,825,963	26,913,636	194,095	5.6	25		N/A
1974	104	605	7,710,317	42,266,274	212,915	5.5	36		N/A
1975	102	592	8,745,294	51,326,259	205,096	5.7	43		1,639,483
1976	141	984	10,603,367	63,919,728	321,010	6.0	148	27.4	875,327
1977	130	1,020	11,733,101	69,967,868	451,273	5.9	148	13.0	730,279
1978	162	926	14,745,709	87,618,320	406,165	5.9	147	6.9	1,273,037
1979	236	889	16,808,605	107,828,057	315,226	6.4	152	10.4	3,555,891
1980	236	1,251	20,845,350	129,948,463	567,292	6.2	151	11.0	1,858,668
1981	177	1,026	5,307,947	33,591,368	542,250	6.3	151	47.4	711,289
1982	90	255	541,006	3,001,210	141,656	5.5	145	24.6	95,834
1983			NO COMMERCIAL FISHERY						
1984	89	137	794,040	4,182,406	112,556	5.2	142	7	35,601
1985	128	130	796,181	4,174,953	85,003	5.2	142	9	6,436
1986	159	230	2,099,576	11,393,934	178,370	5.4	142	12	284,127
1987	236	311	2,122,402	12,289,067	220,871	5.8	145	10	120,388
1988	200	201	1,236,131	7,387,795	153,004	6.0	147	8	23,537
1989	211	287	1,684,706	10,264,791	208,684	6.1	148	8	81,334

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Table 1. (Page 2 of 2)

Year	Number of		Crab <sup>a</sup>	Harvest <sup>a</sup> (pounds)	Pots Pulled	Average		CPUE <sup>b</sup>	% Old Shell	Deadloss (pounds)
	Vessels	Landings				Weight (pounds)	Length (mm)			
1990	240	331	3,120,326	20,362,342	262,131	6.5	152	12	14.7	116,527
1991	302	324	2,630,446	17,177,894	227,555	6.5	152	12	12.1	119,670
1992	281	289	1,196,958	8,043,018	205,940	6.7	153	6	22.3	9,000
1993	292	361	2,261,287	14,628,639	253,794	6.5	152	9	15.2	133,442
1994			NO COMMERCIAL FISHERY							
1995			NO COMMERCIAL FISHERY							
1996 <sup>c</sup>	196	198	1,249,005	8,405,614	76,433	6.7	153	16	24.3	24,166
1997 <sup>d</sup>	256	265	1,315,969	8,756,490	90,510	6.7	152	15	11.0	13,771

<sup>a</sup>Deadloss included.

<sup>b</sup>Defined as catch of legal crabs per pot.

<sup>c</sup>Not including 117,500 pounds landed in Test Fishery.

<sup>d</sup>Not including 154,897 pounds landed in Test Fishery.

Table 2. Bristol Bay commercial red king crab economic performance, 1980-1997.

Year	GHL <sup>a</sup>	Season Total <sup>b</sup> (pounds)	Number of		Number of Pots		Value		Season Length	
			Vessels	Landings	Registered	Pulled	Exvessel	Total <sup>c</sup>	Days	Dates
1980	70-120	128,089,795	236	1,251	78,352	567,292	\$0.90	\$115.3	40	09/10-10/20
1981	70-100	32,880,079	177	1,026	75,756	542,250	\$1.50	\$49.3	91	09/10-12/15
1982	10-20 <sup>d</sup>	2,905,376	90	255	36,166	141,656	\$3.05	\$8.9	30	09/10-10/10
1983				NO COMMERCIAL FISHERY						
1984	2.5- 6.0	4,146,805	89	137	21,762	112,556	\$2.60	\$10.8	15	10/01-10/16
1985	3.0-5.0	4,168,517	128	130	30,117	85,003	\$2.90	\$12.1	8	09/25-10/02
1986	6.0-13.0	11,109,807	159	230	32,468	178,370	\$4.05	\$45.0	13	09/25-10/07
1987	8.5-17.7	12,168,679	236	311	63,000	220,871	\$4.00	\$48.7	12	09/25-10/06
1988	7.5	7,364,258	200	201	50,099	153,004	\$5.10	\$37.6	8	09/25-10/02
1989	16.5	10,183,457	211	287	55,000	208,684	\$5.00	\$50.9	12	09/25-10/06
1990	17.1	20,245,815	240	331	69,906	262,131	\$5.00	\$101.2	12	11/01-11/13
1991	18.0	17,058,224	302	324	89,068	227,555	\$3.00	\$51.2	7	11/01-11-08
1992	10.3	8,034,018	281	289	68,189	205,940	\$5.00	\$40.2	7	11/01-11/08
1993	16.8	14,495,197	292	361	58,881	253,794	\$3.80	\$55.1	9	11/01-11/10
1994				NO COMMERCIAL FISHERY						
1995				NO COMMERCIAL FISHERY						
1996	5.0	8,381,448	196	198	39,461	76,433	\$4.01	\$33.6	4	11/01-11/05
1997	7.0	8,742,719	256	265	27,499	90,510	\$3.26	\$28.5	4	11/01-11/05

<sup>a</sup>Guideline Harvest Level (millions of pounds).<sup>b</sup>Deadloss not included.<sup>c</sup>Millions of dollars<sup>d</sup>Inseason revision to 4.7 million pounds

Table 3. Bristol Bay commercial red king crab harvest composition by fishing season, 1973-1997.

Season	Date	Harvest <sup>a</sup>	Percent		Size Limit <sup>b</sup>	Price per Pound
	Opened-Closed		Recruit	Postrecruit		
1973	06/15-09/09	26.9	63	37	6¼	\$0.84
1974	07/29-10/12	42.3	60	40	6¼	\$0.38
1975	08/01-11/16	51.3	21	79	6¼ <sup>c</sup>	\$0.38
1976	08/15-12/07	63.9	56	44	6½	\$0.58
1977	09/15-12/08	69.9	67	33	6½	\$1.11
1978	09/10-10/23	87.6	75	25	6½	\$1.23
1979	09/15-10/14	107.8	47	53	6½	\$1.01
1980	09/10-10/20	129.9	44	56	6½	\$0.90
1981	09/10-10/20	33.6	14	86	6½ <sup>d</sup>	\$1.50
1982	09/10-10/10	3	68	32	6½	\$3.05
1983		NO COMMERCIAL FISHERY				
1984	10/01-10/16	4.2	59	41	6½	\$2.60
1985	09/25-10/02	4.2	66	34	6½	\$2.90
1986	09/25-10/07	11.4	65	35	6½	\$4.05
1987	09/25-10/06	12.3	77	23	6½	\$4.00
1988	09/25-10/02	7.4	59	41	6½	\$5.10
1989	09/25-10/06	10.3	58	42	6½	\$5.00
1990	11/01-11/13	20.4	49	51	6½	\$5.00
1991	11/01-11/08	17.2	44	56	6½	\$3.00
1992	11/01-11/08	8	33	67	6½	\$5.00
1993	11/01-11/10	14.6	33	67	6½	\$3.80
1994		NO COMMERCIAL FISHERY				
1995		NO COMMERCIAL FISHERY				
1996 <sup>e</sup>	11/01-11/05	8.4	31	69	6½	\$4.01
1997 <sup>e</sup>	11/01-11/05	8.8	28	72	6½	\$3.26

<sup>a</sup>Deadloss included, millions of pounds.

<sup>b</sup>Minimum carapace width in inches.

<sup>c</sup>6½ inches after 11/01.

<sup>d</sup>7 inches after 10/20.

<sup>e</sup>Legal sized old and new shell greater than 153 mm defined as postrecruits.

Table 4. Bristol Bay commercial red king crab catch by statistical area, 1997

Statistical Area	Number of		Pounds <sup>a</sup>	Pots Lifted	Average		Deadloss (pounds)
	Landings	Crab <sup>b</sup>			CPUE	Weight	
625700	4	5,718	38,180	395	14.5	6.68	11
635530	5	11,869	81,070	1,007	11.8	6.83	56
615700	6	43,202	287,935	1,578	27.4	6.66	924
615601	15	51,432	342,750	3,809	13.5	6.66	458
635630	24	57,604	386,618	4,921	11.7	6.71	354
635600	29	76,983	515,507	6,414	12	6.7	434
615630	53	228,996	1,551,540	13,604	16.8	6.78	4,218
625600	73	202,066	1,356,784	17,836	11.5	6.71	2,299
625630	126	610,035	4,003,308	38,727	15.8	6.56	4,847
Other <sup>b</sup>	14	28,064	192,798	2,419	8.2	7.15	170
TOTALS	265 <sup>c</sup>	1,315,969	8,756,490	90,510	14.5	6.65	13,771

<sup>a</sup>Deadloss included

<sup>b</sup>Total of eleven statistical areas.

<sup>c</sup>Total landings for the fishery, does not reflect statistical area landing totals.

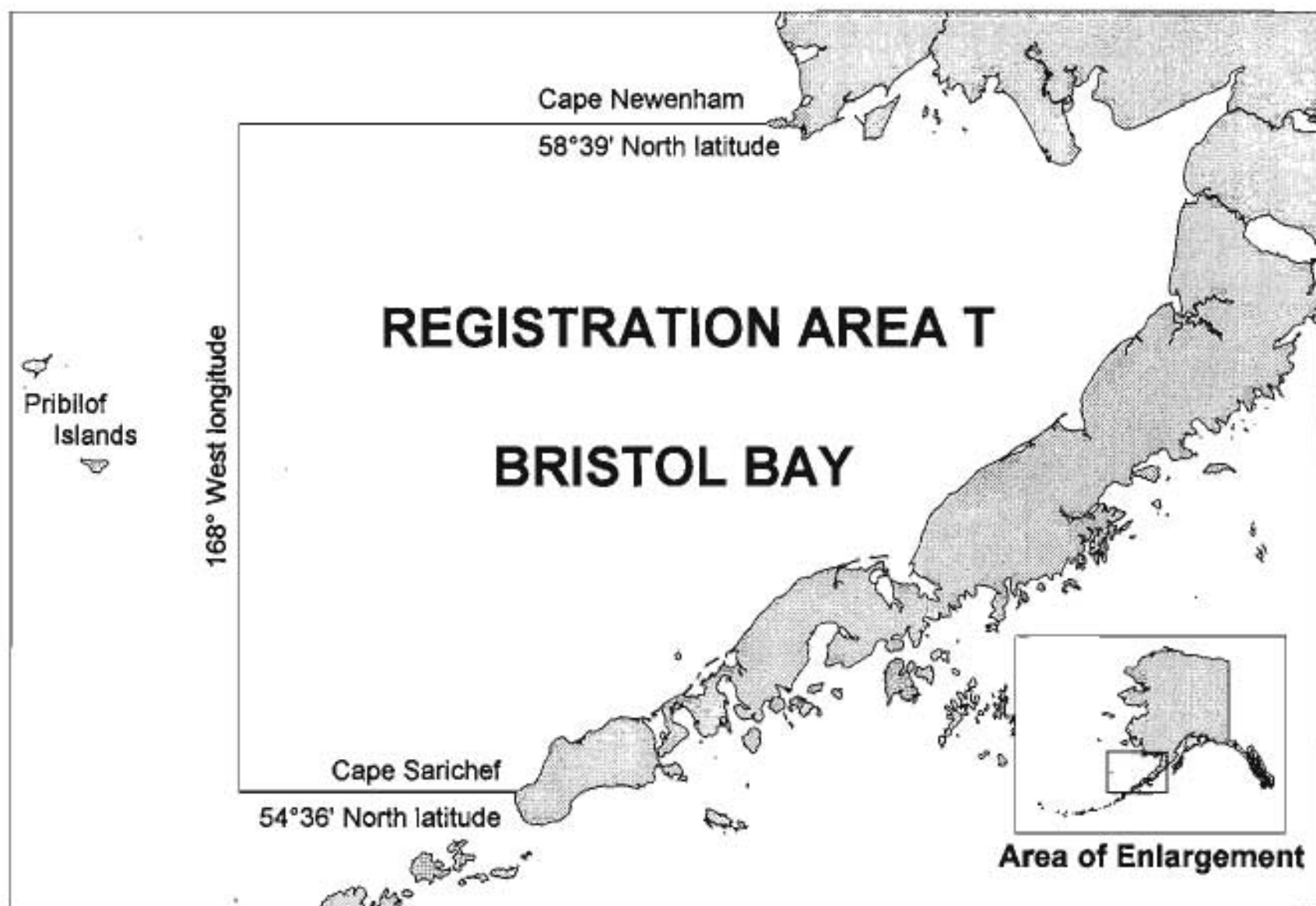


Figure 1. Bristol Bay king crab management area, Registration Area T.

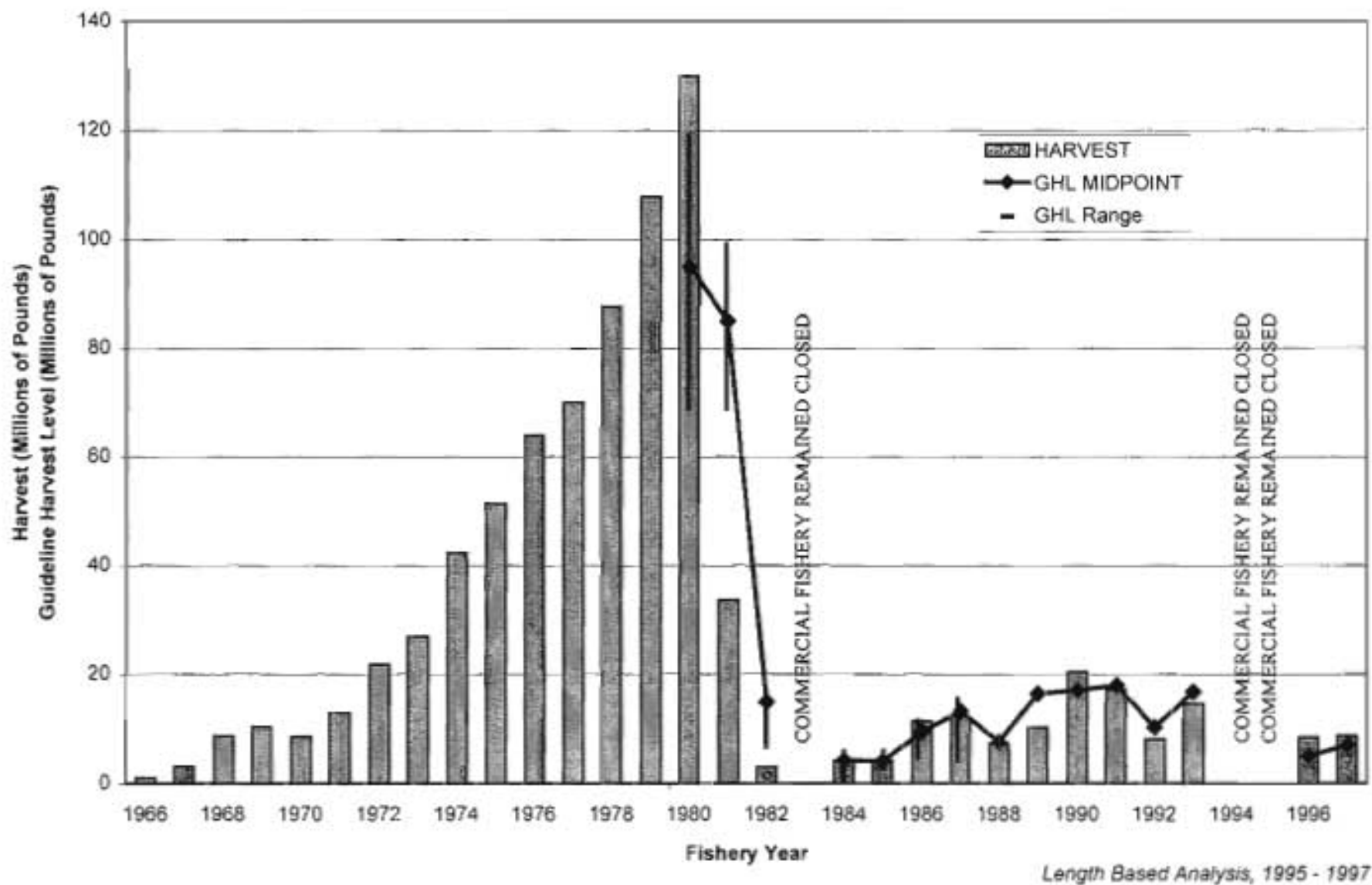


Figure 2. Historic Bristol Bay red king crab harvest and Guideline Harvest Level midpoint, 1966 - 1997.



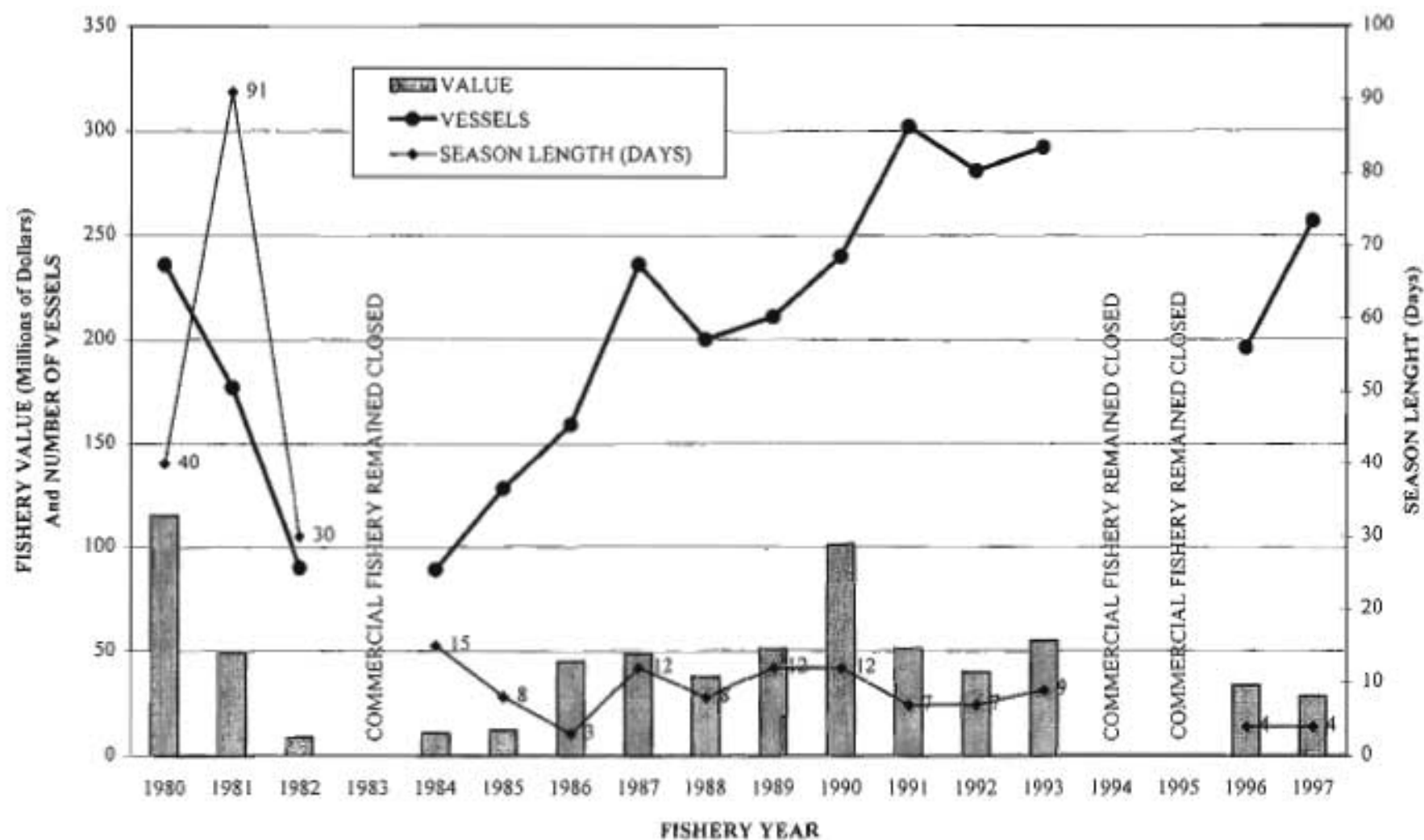


Figure 3. Economic performance of the Bristol Bay red king crab fishery in terms of vessel effort, season length (days), and total fishery value, 1980 - 1997.

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